Claims

1. A delivery device for introducing a substance into or below the stratum corneum of a patient, comprising

a microneedle having a distal end and an interior channel that extends to the distal end,

a pin dimensioned for slidably extending into the interior channel and out the distal end, and an adhesive patch of the type capable of adhering to biological tissue.

2. A delivery device according to claim 1, wherein

the pin has an arcuate distal end for piercing biological tissue.

3. A delivery device according to claim 1, comprising
means for sliding the pin into and out of the interior channel.

4. A delivery device according to claim 1, further comprising
a reservoir for storing a fluid substance to be introduce into the biological tissue.

5. A delivery device according to claim 1, further comprising
a reservoir having a plurality of chambers.

6. A delivery device according to claim 1, further comprising
a pump for pumping a fluid through the interior channel.

7. A delivery device according to claim 6, further comprising a flow controller for controlling the rate at which fluid flows through the interior channel.

8. A delivery device according to claim 1, further comprising
a plug for insertion into a distal end of the channel to prevent tissue from entering the channel.

9. A delivery device according to claim 8, wherein the plug comprises a bioerodible material.

10. A delivery device according to claim 8, wherein the plug comprises a barb for gripping to biological tissue.

11. A delivery device according to claim 1, wherein the microneedle comprises an array of microneedles formed on a substrate.

12. A delivery device according to claim 1, wherein the pin comprises an array of pins fixed to a substrate and arranged to be co-axial with the interior channels of the array of microneedles.

13. A delivery device according to claim 12, further comprising a spring assembly for moving the springs axially within the interior channels.

14. A delivery device according to claim 1, further comprising a flange for coupling to the microneedle to an external device.

15. A delivery device according to claim 1, further comprising a pump for drawing a sample through the interior channel.

16. A transdermal patch, comprising at least one microneedle having an interior channel,

a removable plug disposed at a distal end of the interior channel, as

an adhesive patch for adhering at least one microneedle to biological tissue.

17. A method for introducing a substance into or below the stratum corneum of a patient, comprising

inserting into tissue of a patient a microneedle having a distal end and an interior channel that extends to the distal end, and

sliding a pin dimensioned into the interior channel and out the distal end.

18. A method according to claim 17, further comprising inserting a plurality of microneedles into the tissue of a patient.

19. A method according to claim 17, further comprising pumping a fluid through the microneedle.

20. A method according to claim 18, further comprising operating a syringe for pumping the fluid.